

Safer Battery with Switchable Polymer Coating, Phase I

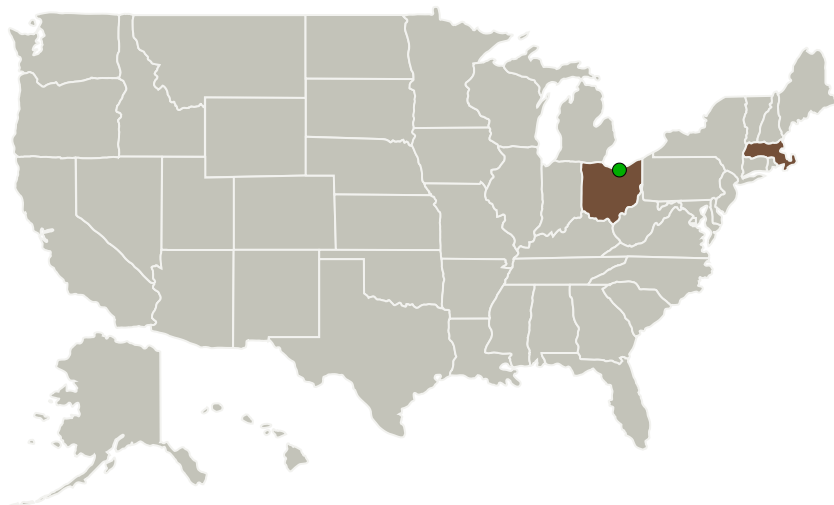
Completed Technology Project (2010 - 2010)



Project Introduction

Physical Sciences Inc. (PSI) proposes to utilize a switchable polymer (SWP) to prevent catastrophic failure due to internal shorting or overdischarge in lithium-ion batteries. The SWP, applied to both the surface of the cathode particles and the cathode current collector, can be reversibly "switched" from an insulator to a conductor upon oxidation permitting normal battery operation. In Phase I, PSI will demonstrate that upon a short or overdischarge the polymer reversibly switches to an insulator reducing the current flow to the cathode material protecting the system and preventing unsafe operation. This reduced current flow will be demonstrated to decrease the localized heat generation by more than two orders of magnitude. PSI will also demonstrate that insulation of the cathode material limits irreversible degradation of the discharge capacity upon overdischarge maintaining cell balance and improving cycle life. In the Phase II program, we will scale up the coating procedure to a production scale, in order to demonstrate the technology in a 5Ah battery. At the conclusion of Phase II, PSI will have demonstrated the technology in full battery systems and be prepared to partner with NASA's industrial partner SAFT America to have cells built for a mock application demonstration.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Physical Sciences, Inc.	Lead Organization	Industry	Andover, Massachusetts
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Massachusetts	Ohio

Project Transitions

**January 2010:** Project Start**July 2010:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/139422>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Physical Sciences, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

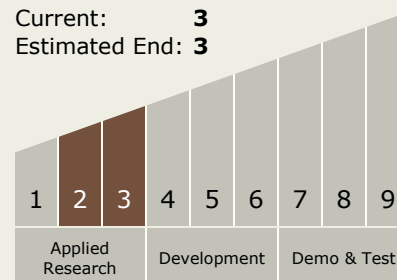
Carlos Torrez

Principal Investigator:

Christopher M Lang

Technology Maturity (TRL)

Start: 2
 Current: 3
 Estimated End: 3



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.2 Energy Storage
 - └ TX03.2.1 Electrochemical: Batteries

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System